CLAIMS

1. A method of forming a thin metal film, comprising:

preparing a dispersed liquid having a metal-containing organic compound dispersed in a predetermined solvent;

coating said dispersed liquid on a surface of a substrate and evaporating the solvent to form a coating layer; and

applying an energy beam to said coating layer to decompose away an organic substance contained in said coating layer in an area irradiated with the energy beam and bond metal contained in said coating layer.

2. A method of forming a thin metal film according to claim 1, wherein a metal powder is dispersed in said dispersed liquid.

3. A method of forming a thin metal film, comprising:

preparing a dispersed liquid having a metal-containing organic compound dispersed in a predetermined solvent;

coating said dispersed liquid on a surface of a substrate and evaporating the solvent to form a coating layer;

applying an energy beam to said coating layer to

decompose away an organic substance contained in said coating layer in an area irradiated with the energy beam and bond metal contained in said coating layer to form a metal pattern; and

dissolving away said metal-containing organic compound left on the surface of the substrate with a solvent.

4. A method of forming a thin metal film according to claim 3, further comprising:

forming an insulating film on the surface of the substrate; and

chemical mechanical polishing the surface of said insulating film.

5. A method of forming a thin metal film according to any one of claims 1 through 4, wherein said metal-containing organic compound comprises ultrafine composite metal particles having a core made substantially of a metal component having an average diameter ranging from 1 to 100 nm and a covering layer of an organic substance chemically bonded to said core, and/or a metal complex.

6. A method of forming a thin metal film according to claim 5, wherein said core made substantially of a metal component has an average diameter ranging from 1 to 20 nm.

7. A method of forming a thin metal film according to any one of claims 1 through 6, wherein said energy beam comprises an electron beam, and is applied in air, an inactive gas, or a vacuum.

8. A semiconductor device having interconnects formed by a method of forming a thin metal film according to any one of claims 1 through 7.

9. An apparatus for forming a thin metal film, comprising:

a dispersed liquid supply device for coating a surface of a substrate with a dispersed liquid having a metal-containing organic compound dispersed in a predetermined solvent; and

an energy beam applying device for applying an energy beam to a coating layer formed by evaporating the solvent in said dispersed liquid coated on the surface of said substrate so as to decompose away an organic substance contained in said coating layer in an area irradiated with the energy beam and bond metal contained in said coating layer.

10. An apparatus for forming a thin metal film according to claim 9, further comprising:

an insulating film forming device for forming an insulating film on the surface of the substrate; and

a polishing device for chemical mechanical

polishing the surface of the substrate to remove an excessive insulating film therefrom.

11. An apparatus for forming a thin metal film according to claim 9 or 10, wherein said dispersed liquid supply device evaporates the solvent in said metal-containing organic compound coated on the surface of the substrate.

12. An apparatus for forming a thin metal film according to claim 9 or 10, further comprising:

a supplementary drying device for supplementarily drying the solvent in said metal-containing organic compound coated on the surface of the substrate.

13. An apparatus for forming a thin metal film according to any one of claims 8 through 12, wherein said devices are sequentially arranged in an indoor facility along a direction in which the substrate moves.

14. An apparatus for forming a thin metal film according to any one of claims 8 through 12, wherein said devices are accommodated individually in respective chambers disposed radially around a central transfer chamber with a transfer robot disposed therein.

15. An apparatus for forming a thin metal film according to claim 13 or 14, further comprising a computer

for controlling said devices according to feedback management.